General

Guideline Title

Final recommendation statement: colorectal cancer: screening.

Bibliographic Source(s)

Final recommendation statement: colorectal cancer: screening. [internet]. Rockville (MD): U.S. Preventive Services Task Force (USPSTF); 2016 Jun [7 p]. [32 references]

Guideline Status

This is the current release of the guideline.

This release updates a previous version: U.S. Preventive Services Task Force. Screening for colorectal cancer: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2008 Nov 4;149(9):627-37.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

The U.S. Preventive Services Task Force (USPSTF) grades its recommendations (A, B, C, D, or I) and identifies the levels of certainty regarding net benefit (High, Moderate, and Low). The definitions of these grades can be found at the end of the "Major Recommendations" field.

Summary of Recommendations and Evidence

The USPSTF recommends screening for colorectal cancer starting at age 50 years and continuing until age 75 years (A recommendation).

The risks and benefits of different screening methods vary. See the "Clinical Considerations" section (below) and the table in the original guideline document for details about screening strategies.

The decision to screen for colorectal cancer in adults aged 76 to 85 years should be an individual one, taking into account the patient's overall health and prior screening history (C recommendation).

- Adults in this age group who have never been screened for colorectal cancer are more likely to benefit.
- Screening would be most appropriate among adults who (1) are healthy enough to undergo treatment if colorectal cancer is detected and (2) do not have comorbid conditions that would significantly limit their life expectancy.

Clinical Considerations

Patient Population Under Consideration

This recommendation applies to asymptomatic adults 50 years and older who are at average risk of colorectal cancer and who do not have a family history of known genetic disorders that predispose them to a high lifetime risk of colorectal cancer (such as Lynch syndrome or familial adenomatous polyposis), a personal history of inflammatory bowel disease, a previous adenomatous polyp, or previous colorectal cancer.

When screening results in the diagnosis of colorectal adenomas or cancer, patients are followed up with a surveillance regimen, and recommendations for screening no longer apply. The USPSTF did not review or consider the evidence on the effectiveness of any particular surveillance regimen after diagnosis and removal of adenomatous polyps or colorectal cancer.

Assessment of Risk

For the vast majority of adults, the most important risk factor for colorectal cancer is older age. Most cases of colorectal cancer occur among adults older than 50 years; the median age at diagnosis is 68 years.

A positive family history (excluding known inherited familial syndromes) is thought to be linked to about 20% of cases of colorectal cancer. About 3% to 10% of the population has a first-degree relative with colorectal cancer. The USPSTF did not specifically review the evidence on screening in populations at increased risk; however, other professional organizations recommend that patients with a family history of colorectal cancer (a first-degree relative with early-onset colorectal cancer or multiple first-degree relatives with the disease) be screened more frequently starting at a younger age and with colonoscopy.

Male sex and black race are also associated with higher colorectal cancer incidence and mortality. Black adults have the highest incidence and mortality rates compared with other racial/ethnic subgroups. The reasons for these disparities are not entirely clear. Studies have documented inequalities in screening, diagnostic follow-up, and treatment; they also suggest that equal treatment generally seems to produce equal outcomes. Accordingly, this recommendation applies to all racial/ethnic groups, with the clear acknowledgment that efforts are needed to ensure that at-risk populations receive recommended screening, follow-up, and treatment.

Screening Tests

The table in the original guideline document lists the various screening tests for colorectal cancer and notes potential frequency of use as well as additional considerations for each method. Figure 3 in the original guideline document presents the estimated number of life-years gained, colorectal cancer deaths averted, lifetime colonoscopies required, and resulting complications per 1000 screened adults aged 50 to 75 years for each of the screening strategies. These estimates are derived from modeling conducted by the Cancer Intervention and Surveillance Modeling Network (CISNET) to inform this recommendation.

Stool-based Tests

Multiple randomized clinical trials (RCTs) have shown that screening with the guaiac-based fecal occult blood test (gFOBT) reduces colorectal cancer deaths. Fecal immunochemical tests (FITs), which identify intact human hemoglobin in stool, have improved sensitivity compared with gFOBT for detecting colorectal cancer. Among the FITs that are cleared by the U.S. Food and Drug Administration (FDA) and available for use in the United States, the OC FIT-CHEK family of FITs (Polymedco)—which include the OC-Light and the OC-Auto—have the best test performance characteristics (i.e., highest sensitivity and specificity). Multitargeted stool DNA testing (FIT-DNA) is an emerging screening strategy that combines a FIT with testing for altered DNA biomarkers in cells shed into the stool. Multitargeted stool DNA testing has increased single-test sensitivity for detecting colorectal cancer compared with FIT alone. The harms of stool-based testing primarily result from adverse events associated with follow-up colonoscopy of positive findings. The specificity of FIT-DNA is lower than that of FIT alone, which means it has a higher number of false-positive results and higher likelihood of follow-up colonoscopy and experiencing an associated adverse event per screening test. There are no empirical data on the appropriate longitudinal follow-up for an abnormal FIT-DNA test result followed by a negative colonoscopy; there is potential for overly intensive surveillance due to clinician and patient concerns about the implications of the genetic component of the test.

Direct Visualization Tests

Several RCTs have shown that flexible sigmoidoscopy alone reduces deaths from colorectal cancer. Flexible sigmoidoscopy combined with FIT has been studied in a single trial and was found to reduce the colorectal cancer–specific mortality rate more than flexible sigmoidoscopy alone. Modeling studies conducted by CISNET also consistently estimate that combined testing yields more life-years gained and colorectal cancer deaths averted compared with flexible sigmoidoscopy alone. Flexible sigmoidoscopy can result in direct harms, such as colonic perforations and bleeding, although the associated event rates are much lower than those observed with colonoscopy. Harms can also occur as a result of follow-up colonoscopy.

Completed trials of flexible sigmoidoscopy provide indirect evidence that colonoscopy—a similar endoscopic screening method—reduces colorectal cancer mortality. A prospective cohort study also found an association between patients who self-reported being screened with colonoscopy and a lower colorectal cancer mortality rate. Colonoscopy has both indirect and direct harms. Harms may be caused by bowel preparation prior to the procedure (e.g., dehydration and electrolyte imbalances), the sedation used during the procedure (e.g., cardiovascular events), or the procedure itself (e.g., infection, colonic perforations, or bleeding).

Evidence for assessing the effectiveness of computed tomography (CT) colonography is limited to studies of its test characteristics. Computed tomography colonography can result in unnecessary diagnostic testing or treatment of incidental extracolonic findings that are of no importance or would never have threatened the patient's health or become apparent without screening (i.e., overdiagnosis and overtreatment). Extracolonic findings are common, occurring in about 40% to 70% of screening examinations. Between 5% and 37% of these findings result in diagnostic follow-up, and about 3% require definitive treatment. As with other screening strategies, indirect harms from CT colonography can also occur from follow-up colonoscopy for positive findings.

Serology Tests

The FDA approved a blood test to detect circulating methylated *SEPT9* DNA (Epi proColon; Epigenomics) in April 2016. A single test characteristic study met the inclusion criteria for the systematic evidence review supporting this recommendation statement; it found the *SEPT9* DNA test to have low sensitivity (48%) for detecting colorectal cancer.

Starting and Stopping Ages

Available RCTs of gFOBT and flexible sigmoidoscopy included patients with age ranges of 45 to 80 years and 50 to 74 years, respectively. For gFOBT, the majority of participants entered the trials at age 50 or 60 years; for flexible sigmoidoscopy, the mean age of participants was 56 to 60 years.

Microsimulation analyses performed by CISNET suggest that starting colorectal cancer screening at age 45 years rather than 50 years is estimated to yield a modest increase in life-years gained and a more efficient balance between life-years gained and lifetime number of colonoscopies (a proxy measure for the burden of screening). However, across the different screening methods, lowering the age at which to begin screening to 45 years while maintaining the same screening interval resulted in an estimated increase in the lifetime number of colonoscopies. In the case of screening colonoscopy, 2 of the 3 models found that by starting screening at age 45 years, the screening interval could be extended from 10 to 15 years. Doing so maintained the same (or slightly more) life-years gained as performing colonoscopy every 10 years starting at age 50 years without increasing the lifetime number of colonoscopies. However, 1 model estimated a slight loss in life-years gained with a longer screening interval and an earlier age at which to begin screening.

The USPSTF considered these findings and concluded that the evidence best supports a starting age of 50 years for the general population, noting the modest increase in life-years gained by starting screening earlier, the discordant findings across models for extending the screening interval when the age at which to begin screening is lowered, and the lack of empirical evidence in younger populations.

The age at which the balance of benefits and harms of colorectal cancer screening becomes less favorable varies based on a patient's life expectancy, health status, comorbid conditions, and prior screening status. Empirical data from randomized trials on outcomes of screening after age 74 years are scarce. All 3 CISNET models consistently estimate that few additional life-years are gained when screening is extended past age 75 years among average-risk adults who have previously received adequate screening.

The USPSTF does not recommend routine screening for colorectal cancer in adults 86 years and older. In this age group, competing causes of mortality preclude a mortality benefit that would outweigh the harms.

Screening Intervals

Evidence from RCTs demonstrates that annual or biennial screening with gFOBT as well as 1-time and every 3- to 5-year flexible sigmoidoscopy reduces colorectal cancer deaths. The CISNET models found that several screening strategies were estimated to yield comparable life-years gained (i.e., life-years gained with the noncolonoscopy strategies were within 90% of those gained with the colonoscopy strategy) among adults aged 50 to 75 years and an efficient balance of benefits and harms (see the full CISNET report for more details [see the "Availability of Companion Documents" field]). These screening strategies include (1) annual screening with FIT, (2) screening every 10 years with flexible sigmoidoscopy and annual screening with FIT, (3) screening every 10 years with colonoscopy, and (4) screening every 5 years with CT colonography. The findings for CT colonography depend on the proxy measure used for the burden of screening (number of lifetime colonoscopies or lifetime cathartic bowel preparations). Two of the 3 CISNET models found that FIT-DNA screening every 3 years (as recommended by the manufacturer) was estimated to yield life-years gained less than 90% of the colonoscopy screening strategy (84% and 87%, respectively). Another way to conceptualize these findings is to note that CISNET modeling found that FIT-DNA screening every 3 years was estimated to provide

about the same amount of benefit as screening with flexible sigmoidoscopy alone every 5 years (see Figure 3 in the original guideline document).

Treatment

Treatment of early-stage colorectal cancer generally consists of local excision or simple polypectomy for tumors limited to the colonic mucosa or surgical resection (via laparoscopy or open approach) with anastomosis for larger, localized lesions.

Other Approaches to Prevention

The USPSTF has made a recommendation on aspirin use for the primary prevention of cardiovascular disease and colorectal cancer in average-risk adults (https://www.uspreventiveservicestaskforce.org).

Definitions

What the USPSTF Grades Mean and Suggestions for Practice

Grade	Grade Definitions	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer or provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate, or there is moderate certainty that the net benefit is moderate to substantial.	Offer or provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer or provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality or conflicting, and the balance of benefits and harms cannot be determined.	Read the "Clinical Considerations" section of the USPSTF Recommendation Statement (see the "Major Recommendations" field). If offered, patients should understand the uncertainty about the balance of benefits and harms.

USPSTF Levels of Certainty Regarding Net Benefit

Definition: The USPSTF defines certainty as "likelihood that the USPSTF assessment of the net benefit of a preventive service is correct." The net benefit is defined as benefit minus harm of the preventive service as implemented in a general, primary care population. The USPSTF assigns a certainty level based on the nature of the overall evidence available to assess the net benefit of a preventive service.

Level of Certainty	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by factors such as: • The number, size, or quality of individual studies • Inconsistency of findings across individual studies • Limited generalizability of findings to routine primary care practice • Lack of coherence in the chain of evidence As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of:

Level of Certainty	Description
	• The limited number or size of studies • Important flaws in study design or methods • Inconsistency of findings across individual studies • Gaps in the chain of evidence • Findings not generalizable to routine primary care practice • A lack of information on important health outcomes More information may allow an estimation of effects on health outcomes.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Colorectal cancer

Guideline Category

Prevention

Screening

Clinical Specialty

Family Practice

Gastroenterology

Geriatrics

Internal Medicine

Preventive Medicine

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Health Care Providers

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To update the 2008 U.S. Preventive Services Task Force (USPSTF) recommendation on screening for colorectal cancer

Target Population

Asymptomatic adults 50 years and older who are at average risk of colorectal cancer and who do not have a family history of known genetic disorders that predispose them to a high lifetime risk of colorectal cancer (such as Lynch syndrome or familial adenomatous polyposis), a personal history of inflammatory bowel disease, a previous adenomatous polyp, or previous colorectal cancer

Interventions and Practices Considered

Screening for colorectal cancer

Major Outcomes Considered

- Key Question 1: What is the effectiveness (or comparative effectiveness) of screening programs based on any of the following screening tests (alone or in combination) in reducing (a) incidence of and (b) mortality from colorectal cancer: colonoscopy; flexible sigmoidoscopy; computed tomographic colonography; stool screening tests (guaiac fecal occult blood, fecal immunochemical, stool-based deoxyribonucleic acid [DNA] or multitarget stool DNA tests); and blood screening tests (methylated *SEPT9* DNA)?
- Key Question 2: What are the test performance characteristics (e.g., sensitivity and specificity) of the following screening tests (alone or in combination) for detecting (a) colorectal cancer, (b) advanced adenomas, and (c) adenomatous polyps based on size: colonoscopy; flexible sigmoidoscopy; computed tomographic colonography; stool screening tests (high-sensitivity guaiac fecal occult blood, fecal immunochemical, stool-based DNA or multitarget stool DNA tests); and blood screening tests (methylated *SEPT9* DNA)?
- Key Question 3a: What are the adverse effects (i.e., serious harms) of the different screening tests (either as single application or in a screening program)?
- Key Question 3b: Do adverse effects vary by important subpopulations (e.g., age)?

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic evidence review was prepared by the Kaiser Permanente Research Affiliates Evidence-based Practice Center (EPC) for the U.S. Preventive Services Task Force (USPSTF) (see the "Availability of Companion Documents" field).

Data Source and Searches

MEDLINE, PubMed, and the Cochrane Central Register of Controlled Trials were searched to locate primary studies informing the key questions (see the eMethods in the systematic review supplement) that were published from the end of the previous review (January 1, 2008) through December 31, 2014. The database searches were supplemented with expert suggestions and by reviewing reference lists from all other relevant systematic reviews, including the 2008 USPSTF evidence report. The search also included selected gray literature sources, including ClinicalTrials.gov and the World Health Organization International Clinical Trials Registry Platform, for ongoing trials. Since December 2014, the investigators continued to conduct ongoing surveillance through article alerts and targeted searches of high-impact journals to identify major studies published in the interim that may affect the conclusions or understanding of the evidence and therefore the related USPSTF recommendation. The last surveillance was conducted on February 23, 2016. Although several potentially relevant new studies were identified, none of these studies would substantively change the review's interpretation of findings or conclusions.

Study Selection

Two investigators independently reviewed 8492 titles and abstracts and 696 articles against the specified inclusion criteria (see Figure 2 in the systematic review). Discrepancies were resolved through consensus and consultation with a third investigator. Inclusion criteria were fair- and good-quality English-language studies of asymptomatic screening populations of individuals who were 40 years or older, either at average risk for colorectal cancer (CRC) or not selected for inclusion based on CRC risk factors. Studies were included that evaluated the following screening tests: colonoscopy, flexible sigmoidoscopy (SIG), computed tomographic colonography (CTC), guaiac-based fecal occult blood testing (gFOBT), immunochemical-based fecal occult blood testing (FIT), FIT plus stool deoxyribonucleic acid (sDNA), or a blood test for methylated *SEPT9* DNA (m*SEPT9*).

For Key Question 1 (KQ1), randomized clinical trials (RCTs) or otherwise controlled trials of CRC screening vs. no screening, as well as trials comparing screening tests, that included outcomes of cancer incidence, CRC-specific mortality, or all-cause mortality were reviewed for inclusion. For tests without trial-level evidence (i.e., colonoscopy, FIT), well-conducted prospective cohort or population-based nested case-control studies were examined.

For Key Question 2 (KQ2), diagnostic accuracy studies that used colonoscopy as a reference standard were included. Studies whose design was subject to a high risk of bias were generally excluded, including studies that did not apply colonoscopy to at least a random subset of screen-negative persons (verification bias) and studies without an adequate representation of a full spectrum of patients (spectrum bias), such as case-control studies. Selected well-conducted FIT diagnostic accuracy studies that used robust registry follow-up for screen-negative participants were included.

For Key Question 3 (KQ3), all trials and observational studies that reported serious adverse events requiring unexpected or unwanted medical attention or resulting in death were included. These events included, but were not limited to, perforation, major bleeding, severe abdominal symptoms, and cardiovascular events. Studies designed to assess for extracolonic findings (i.e., incidental findings on CTC) and the resultant diagnostic yield and harms of workup were also included. Studies reporting extracolonic findings generally used the CT Colonography Reporting and Data System (C-RADS). Under C-RADS, extracolonic findings are categorized as E0 (limited examination), E1 (normal examination or normal variant), E2 (clinically unimportant finding in which no workup is required), E3 (likely unimportant or incompletely characterized in which workup may be required), or E4 (potentially important finding requiring follow-up).

Number of Source Documents

See the literature search flow diagram (Figure 2) in the systematic review (see the "Availability of Companion Documents" field) for a summary of evidence search and selection.

Articles included for Key Questions:

- Key Question 1: 47 articles (25 studies)
- Key Question 2: 44 articles (33 studies)
- Key Question 3: 113 articles (98 studies)

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Two reviewers each critically appraised all articles that met inclusion criteria using the U.S. Preventive Services Task Force (USPSTF) design-specific quality criteria supplemented by the National Institute for Health and Care Excellence methodology checklists, A Measurement Tool to Assess Systematic Reviews (AMSTAR) for systematic reviews, Newcastle Ottawa Scales for cohort and case-control studies, and Quality Assessment of Diagnostic Accuracy (QUADAS) and QUADAS-2 for studies of diagnostic accuracy (see eTable 1 in the systematic review supplement [see the "Availability of Companion Documents" field]). Each study was given a final quality rating of good, fair, or poor.

Methods Used to Analyze the Evidence

Meta-Analysis

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Note from the National Guideline Clearinghouse (NGC): A systematic evidence review was prepared by the Kaiser Permanente Research Affiliates Evidence-based Practice Center (EPC) for the U.S. Preventive Services Task Force (USPSTF) (see the "Availability of Companion Documents" field).

Data Extraction and Quality Assessment

Two reviewers each critically appraised all articles that met inclusion criteria using the USPSTF design-specific quality criteria supplemented by the National Institute for Health and Care Excellence methodology checklists, A Measurement Tool to Assess Systematic Reviews (AMSTAR) for systematic reviews, Newcastle Ottawa Scales for cohort and case-control studies, and Quality Assessment of Diagnostic Accuracy (QUADAS) and QUADAS-2 for studies of diagnostic accuracy (see eTable 1 in the evidence review supplement). Poor-quality studies and those with a single fatal flaw or multiple important limitations that could invalidate results were excluded from this review. Disagreements about critical appraisal were resolved by consensus and, if needed, consultation with a third independent reviewer. One reviewer extracted key data from included studies; a second reviewer checked the data for accuracy.

Data Synthesis and Analysis

For each Key Question (KQ), the number and design of included studies, overall results, consistency or precision of results, reporting bias, study quality, limitations of the body of evidence, and applicability of findings were summarized. The results were synthesized by KQ, type of screening test, and study design. Studies from the 2008 review that met the updated inclusion criteria were incorporated. The analyses for test performance focused primarily on per-person (i.e., by individual patient rather than by lesion) test sensitivity and specificity to detect adenomas (by size, where reported, <6 mm, ≥6 mm, ≥10 mm), advanced adenomas (as defined by the study), and colorectal cancer (CRC). The studies used several kinds of immunochemical-based fecal occult blood tests (FITs), which were grouped as qualitative (fixed cutoff) or quantitative (adjustable cutoff), as well as into *families* (tests produced by the same manufacturer, using the same components and method, or compatible with different automated analyzers). Tests were compared using similar cutoff values expressed in µg hemoglobin (Hb)/g feces.

Because of the limited number of studies and the clinical heterogeneity of studies, the analyses were largely descriptive. Random-effects meta-analyses were conducted using the profile likelihood method to estimate the effect of flexible sigmoidoscopy (SIG) based on the pooled incidence rate ratio (events/person-year) for CRC incidence and mortality across the 4 major SIG trials. Random-effects models were also conducted using the restricted maximum likelihood estimation method to estimate rates of serious adverse events for colonoscopy and SIG. The presence and magnitude of statistical heterogeneity were assessed among pooled studies using the I^2 statistic. All tests were 2-sided with a P value less than 0.05 indicating statistical significance. Meta-analyses were performed using R version 3.0.2 (R Project for Statistical Computing).

Methods Used to Formulate the Recommendations

Balance Sheets

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The U.S. Preventive Services Task Force (USPSTF) systematically reviews the evidence concerning both the benefits and harms of widespread implementation of a preventive service. It then assesses the certainty of the evidence and the magnitude of the benefits and harms. On the basis of this assessment, the USPSTF assigns a letter grade to each preventive service signifying its recommendation about provision of the service (see table below). An important, but often challenging, step is determining the balance between benefits and harms to estimate "net benefit" (that is, benefits minus harms).

U.S. Preventive Services Task Force Recommendation Grid*

Certainty of Net Benefit	Magnitude of Net Benefit			
	Substantial	Moderate	Small	Zero/Negative
High	A	B	C	D
Moderate	B	B	C	D
Low	Insufficient			

**A, B, C, D*, and *I (Insufficient)* represent the letter grades of recommendation or statement of insufficient evidence assigned by the USPSTF after assessing certainty and magnitude of net benefit of the service (see the "Rating Scheme for the Strength of the Recommendations" field.

The overarching question that the USPSTF seeks to answer for every preventive service is whether evidence suggests that provision of the service would improve health outcomes if implemented in a general primary care population. For screening topics, this standard could be met by a large randomized controlled trial (RCT) in a representative asymptomatic population with follow-up of all members of both the group "invited for screening" and the group "not invited for screening."

Direct RCT evidence about screening is often unavailable, so the USPSTF considers indirect evidence. To guide its selection of indirect evidence, the USPSTF constructs a "chain of evidence" within an analytic framework. For each key question, the body of pertinent literature is critically appraised, focusing on the following 6 questions:

1. Do the studies have the appropriate research design to answer the key question(s)?
2. To what extent are the existing studies of high quality? (i.e., what is the internal validity?)
3. To what extent are the results of the studies generalizable to the general U.S. primary care population and situation? (i.e., what is the external validity?)
4. How many studies have been conducted that address the key question(s)? How large are the studies? (i.e., what is the precision of the evidence?)
5. How consistent are the results of the studies?
6. Are there additional factors that assist the USPSTF in drawing conclusions (e.g., presence or absence of dose–response effects, fit within a biologic model)?

The next step in the USPSTF process is to use the evidence from the key questions to assess whether there would be net benefit if the service were implemented. In 2001, the USPSTF published an article that documented its systematic processes of evidence evaluation and recommendation development. At that time, the USPSTF's overall assessment of evidence was described as good, fair, or poor. The USPSTF realized that this rating seemed to apply only to how well studies were conducted and did not fully capture all of the issues that go into an overall assessment of the evidence about net benefit. To avoid confusion, the USPSTF has changed its terminology. Whereas individual study quality will continue to be characterized as good, fair, or poor, the term certainty will now be used to describe the USPSTF's assessment of the overall body of evidence about net benefit of a preventive service and the likelihood that the assessment is correct. Certainty will be determined by considering all 6 questions listed above; the judgment about certainty will be described as high, moderate, or low.

In making its assessment of certainty about net benefit, the evaluation of the evidence from each key question plays a primary role. It is important to note that the USPSTF makes recommendations for real-world medical practice in the United States and must determine to what extent the evidence for each key question—even evidence from screening RCTs or treatment RCTs—can be applied to the general primary care population. Frequently, studies are conducted in highly selected populations under special conditions. The USPSTF must consider differences between the general primary care population and the populations studied in RCTs and make judgments about the likelihood of observing the same effect in actual practice.

It is also important to note that one of the key questions in the analytic framework refers to the potential harms of the preventive service. The USPSTF considers the evidence about the benefits and harms of preventive services separately and equally. Data about harms are often obtained from observational studies because harms observed in RCTs may not be representative of those found in usual practice and because some harms are not completely measured and reported in RCTs.

Putting the body of evidence for all key questions together as a chain, the USPSTF assesses the certainty of net benefit of a preventive service by asking the 6 major questions listed above. The USPSTF would rate a body of convincing evidence about the benefits of a service that, for example, derives from several RCTs of screening in which the estimate of benefits can be generalized to the general primary care population as "high" certainty (see the "Rating Scheme for the Strength of Recommendations" field). The USPSTF would rate a body of evidence that was not clearly applicable to general practice or has other defects in quality, research design, or consistency of studies as "moderate" certainty. Certainty is "low" when, for example, there are gaps in the evidence linking parts of the analytic framework, when evidence to determine the harms of treatment is unavailable, or when evidence about the benefits of treatment is insufficient. Table 4 in the methodology document listed below (see the

"Availability of Companion Documents" field) summarizes the current terminology used by the USPSTF to describe the critical assessment of evidence at all 3 levels: individual studies, key questions, and overall certainty of net benefit of the preventive service.

Sawaya GF, Guirguis-Blake J, LeFevre M, Harris R, Petitti D; U.S. Preventive Services Task Force. Update on the methods of the U.S. Preventive Services Task Force: estimating certainty and magnitude of net benefit. Ann Intern Med. 2007;147(12):871-875. [5 references].

Rating Scheme for the Strength of the Recommendations

What the U.S. Preventive Services Task Force (USPSTF) Grades Mean and Suggestions for Practice

Grade	Grade Definitions	Suggestions for Practice
A	The USPSTF recommends the service. There is high certainty that the net benefit is substantial.	Offer or provide this service.
B	The USPSTF recommends the service. There is high certainty that the net benefit is moderate, or there is moderate certainty that the net benefit is moderate to substantial.	Offer or provide this service.
C	The USPSTF recommends selectively offering or providing this service to individual patients based on professional judgment and patient preferences. There is at least moderate certainty that the net benefit is small.	Offer or provide this service for selected patients depending on individual circumstances.
D	The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Discourage the use of this service.
I Statement	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality or conflicting, and the balance of benefits and harms cannot be determined.	Read the "Clinical Considerations" section of the USPSTF Recommendation Statement (see the "Major Recommendations" field). If offered, patients should understand the uncertainty about the balance of benefits and harms.

USPSTF Levels of Certainty Regarding Net Benefit

Definition: The USPSTF defines certainty as "likelihood that the USPSTF assessment of the net benefit of a preventive service is correct." The net benefit is defined as benefit minus harm of the preventive service as implemented in a general, primary care population. The USPSTF assigns a certainty level based on the nature of the overall evidence available to assess the net benefit of a preventive service.

Level of Certainty	Description
High	The available evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects of the preventive service on health outcomes. This conclusion is therefore unlikely to be strongly affected by the results of future studies.
Moderate	The available evidence is sufficient to determine the effects of the preventive service on health outcomes, but confidence in the estimate is constrained by factors such as: • The number, size, or quality of individual studies • Inconsistency of findings across individual studies • Limited generalizability of findings to routine primary care practice • Lack of coherence in the chain of evidence As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of: • The limited number or size of studies • Important flaws in study design or methods • Inconsistency of findings across individual studies • Gaps in the chain of evidence

Level of Certainty	Description
	• Findings not generalizable to routine primary care practice • A lack of information on important health outcomes
	More information may allow an estimation of effects on health outcomes.

Cost Analysis

The U.S. Preventive Services Task Force (USPSTF) does not consider the costs of providing a service in this assessment.

Method of Guideline Validation

Comparison with Guidelines from Other Groups

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Peer Review

Before the U.S. Preventive Services Task Force (USPSTF) makes its final determinations about recommendations on a given preventive service, the Evidence-based Practice Center and the Agency for Healthcare Research and Quality send the draft evidence review to 4 to 6 external experts and to Federal agencies and professional and disease-based health organizations with interests in the topic. The experts are asked to examine the review critically for accuracy and completeness and to respond to a series of specific questions about the document. The draft evidence review is also posted on the USPSTF Web site for public comment. After assembling these external review comments and documenting the proposed response to key comments, the topic team presents this information to the USPSTF in memo form. In this way, the USPSTF can consider these external comments before it votes on its recommendations about the service. Draft recommendation statements are then circulated for comment among reviewers representing professional societies, voluntary organizations, and Federal agencies, as well as posted on the USPSTF Web site for public comment. These comments are discussed before the final recommendations are confirmed.

Response to Public Comment

A draft version of this recommendation statement was posted for public comment on the USPSTF Web site from October 6 to November 2, 2015. Many comments expressed concern that the terms "recommended" and "alternative" to describe the testing strategies lacked clarity and were confusing to interpret. In response, the USPSTF removed these terms from the final recommendation to better communicate the primary message of importance: there is convincing evidence that screening for colorectal cancer provides substantial benefit for adults aged 50 to 75 years, and a sizable proportion of the eligible U.S. population is not taking advantage of this effective preventive health strategy. With this recommendation, the USPSTF acknowledges that there is no "one size fits all" approach to colorectal cancer screening and seeks to provide clinicians and patients with the best possible evidence about the various screening methods to enable informed, individual decision making. Accordingly, both the table and Figure 3 in the original guideline document were updated to provide more detailed information about the available evidence on the effectiveness of each method, as well as the strengths, limitations, and unique considerations for the various screening tests.

Recommendations of Others

Recommendations for screening from the following groups were considered: the American Cancer Society, the American College of Radiology, the U.S. Multi-Society Task Force (including the American Gastroenterological Association, the American College of Gastroenterology, and the American Society for Gastrointestinal Endoscopy), the American College of Gastroenterology, the National Comprehensive Cancer Network, the American College of Physicians, the American Academy of Physicians, and the Canadian Task Force on Preventive Health Care.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is not specifically stated.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Benefits of Screening and Early Intervention

The USPSTF found convincing evidence that screening for colorectal cancer in adults aged 50 to 75 years reduces colorectal cancer mortality. The USPSTF found no head-to-head studies demonstrating that any of the screening strategies it considered are more effective than others, although the tests have varying levels of evidence supporting their effectiveness, as well as different strengths and limitations (see the table in the original guideline document). About one-third of eligible adults in the United States have never been screened for colorectal cancer, and offering choice in colorectal cancer screening strategies may increase screening uptake. As such, the screening tests are not presented in any preferred or ranked order; rather, the goal is to maximize the total number of persons who are screened because that will have the largest effect on reducing colorectal cancer deaths.

The benefit of early detection of and intervention for colorectal cancer declines after age 75 years. Among older adults who have been previously screened for colorectal cancer, there is at best a moderate benefit to continuing screening during the ages of 76 to 85 years. However, adults in this age group who have never been screened for colorectal cancer are more likely to benefit than those who have been previously screened.

The time between detection and treatment of colorectal cancer and realization of a subsequent mortality benefit can be substantial. As such, the benefit of early detection of and intervention for colorectal cancer in adults 86 years and older is at most small.

To date, no method of screening for colorectal cancer has been shown to reduce all-cause mortality in any age group.

Potential Harms

Harms of Screening and Early Intervention

The harms of screening for colorectal cancer in adults aged 50 to 75 years are small. The majority of harms result from the use of colonoscopy, either as the screening test or as follow-up for positive findings detected by other screening tests. The rate of serious adverse events from colorectal cancer screening increases with age. Thus, the harms of screening for colorectal cancer in adults 76 years and older are small to moderate.

Qualifying Statements

Qualifying Statements

- The U.S. Preventive Services Task Force (USPSTF) makes recommendations about the effectiveness of specific clinical preventive services for patients without obvious related signs or symptoms.
- It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment.
- The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.
- Recommendations made by the USPSTF are independent of the U.S. government. They should not be construed as an official position of the Agency for Healthcare Research and Quality (AHRQ) or the U.S. Department of Health and Human Services.

Implementation of the Guideline

Descriptions of Implementation Strategies

Description of Implementation Strategy

The experiences of the first and second U.S. Preventive Services Task Force (USPSTF), as well as that of other evidence-based guideline efforts, have highlighted the importance of identifying effective ways to implement clinical recommendations. Practice guidelines are relatively weak tools for changing clinical practice when used in isolation. To effect change, guidelines must be coupled with strategies to improve their acceptance and feasibility. Such strategies include enlisting the support of local opinion leaders, using reminder systems for clinicians and patients, adopting standing orders, and audit and feedback of information to clinicians about their compliance with recommended practice.

In the case of preventive services guidelines, implementation needs to go beyond traditional dissemination and promotion efforts to recognize the added patient and clinician barriers that affect preventive care. These include clinicians' ambivalence about whether preventive medicine is part of their job, the psychological and practical challenges that patients face in changing behaviors, lack of access to health care or of insurance coverage for preventive services for some patients, competing pressures within the context of shorter office visits, and the lack of organized systems in most practices to ensure the delivery of recommended preventive care.

Dissemination strategies have changed dramatically in this age of electronic information. While recognizing the continuing value of journals and other print formats for dissemination, the USPSTF will make all its products available through its Web site . The combination of electronic access and extensive material in the public domain should make it easier for a broad audience of users to access USPSTF materials and adapt them for their local needs. Online access to USPSTF products also opens up new possibilities for the appearance of the annual, pocket-size *Guide to Clinical Preventive Services*.

To be successful, approaches for implementing prevention have to be tailored to the local level and deal with the specific barriers at a given site, typically requiring the redesign of systems of care. Such a systems approach to prevention has had notable success in established staff-model health maintenance organizations, by addressing organization of care, emphasizing a philosophy of prevention, and altering the training and incentives for clinicians. Staff-model plans also benefit from integrated information systems that can track the use of needed services and generate automatic reminders aimed at patients and clinicians, some of the most consistently successful interventions. Information systems remain a major challenge for individual clinicians' offices, however, as well as for looser affiliations of practices in network-model managed care and independent practice associations, where data on patient visits, referrals, and test results are not always centralized.

Implementation Tools

Mobile Device Resources

Patient Resources

Pocket Guide/Reference Cards

Resources

Staff Training/Competency Material

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Final recommendation statement: colorectal cancer: screening. [internet]. Rockville (MD): U.S. Preventive Services Task Force (USPSTF); 2016 Jun [7 p]. [32 references]

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2016 Jun

Guideline Developer(s)

U.S. Preventive Services Task Force - Independent Expert Panel

Guideline Developer Comment

The U.S. Preventive Services Task Force (USPSTF) is a federally-appointed panel of independent experts. Conclusions of the USPSTF do not necessarily reflect policy of the U.S. Department of Health and Human Services (DHHS) or its agencies.

Source(s) of Funding

The U.S. Preventive Services Task Force (USPSTF) is an independent, voluntary body. The U.S. Congress mandates that the Agency for Healthcare Research and Quality (AHRQ) support the operations of the USPSTF.

Guideline Committee

U.S. Preventive Services Task Force (USPSTF)

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*Members of the USPSTF at the time this recommendation was finalized. For a list of current Task Force members, go to

https://www.uspreventiveservicestaskforce.org/members.htm.

Financial Disclosures/Conflicts of Interest

The U.S. Preventive Services Task Force (USPSTF) has an explicit policy concerning conflict of interest. All members disclose at each meeting if they have a significant financial, professional/business, or intellectual conflict for each topic being discussed. USPSTF members with conflicts may be recused from discussing or voting on recommendations about the topic in question.

Disclosures

All authors have completed and submitted the International Committee of Medical Journal Editors (ICMJE) Form for Disclosure of Potential Conflicts of Interest and none were reported. Authors followed the policy regarding conflicts of interest described at https://www.uspreventiveservicestaskforce.org/Page/Name/conflict-of-interest-disclosures.

Guideline Status

This is the current release of the guideline.

This release updates a previous version: U.S. Preventive Services Task Force. Screening for colorectal cancer: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2008 Nov 4;149(9):627-37.

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the U.S. Preventive Services Task Force (USPSTF) Web site.

Availability of Companion Documents

The following are available:

Evidence Reviews:

- Lin JS, Piper MA, Perdue LA, Rutter C, Webber EM, O'Connor E, Smith N, Whitlock EP. Screening for colorectal cancer: updated evidence report and systematic review for the U.S. Preventive Services Task Force. JAMA. 2016 Jun 21;315(23):2576-94. Available from the U.S. Preventive Services Task Force (USPSTF) Web site.
- Lin JS, Piper MA, Perdue LA, Rutter C, Webber EM, O'Connor E, Smith N, Whitlock EP. Screening for colorectal cancer: a systematic review for the U.S. Preventive Services Task Force. Evidence Synthesis No. 135. AHRQ Publication No. 14-05203-EF-1. Rockville (MD): Agency for Healthcare Research and Quality; 2016 Jun. 230 p. Available from the U.S. Preventive Services Task Force (USPSTF) Web site.

Background Articles:

- Barton MB et al. How to read the new recommendation statement: methods update from the U.S. Preventive Services Task Force. Ann Intern Med 2007;147:123-7.
- Guirguis-Blake J et al. Current processes of the U.S. Preventive Services Task Force: refining evidence-based recommendation development. Ann Intern Med 2007;147:117-22.
- Sawaya GF et al. Update on the methods of the U.S. Preventive Services Task Force: estimating certainty and magnitude of net benefit. Ann Intern Med 2007;147:871-5.

Available from the USPSTF Web site.

The following are also available:

- Screening for colorectal cancer: clinical summary. Rockville (MD): U.S. Preventive Services Task Force. 2016 Jun. 1 p. Available from the

USPSTF Web site.

- Knudsen AB, Zauber AG, Rutter CM, Naber SK, Doria-Rose VP, Pabiniak C, Johanson C, Fischer SE, Lansdorp-Vogelaar I, Kuntz KM. Estimation of benefits, burden, and harms of colorectal cancer screening strategies: modeling study for the US Preventive Services Task Force. JAMA. 2016 Jun 21;315(23):2595-609.
- Zauber A, Knudsen A, Rutter CM, Lansdorp-Vogelaar I, Kuntz KM. Evaluating the benefits and harms of colorectal cancer screening strategies: a collaborative modeling approach. AHRA Publication No. 14-05203-EF-2. Rockville (MD): Agency for Healthcare Research and Quality; 2015 Oct. 122 p. Available from the USPSTF Web site.

The Electronic Preventive Services Selector (ePSS) is an application designed to provide primary care clinicians and health care teams timely decision support regarding appropriate screening, counseling, and preventive services for their patients. It is based on the current, evidence-based recommendations of the USPSTF and can be searched by specific patient characteristics, such as age, sex, and selected behavioral risk factors.

Patient Resources

The following are available:

- Screening for colorectal cancer. Understanding Task Force recommendations. Rockville (MD): U.S. Preventive Services Task Force. 2016 Jun. 4 p. Available from the U.S. Preventive Services Task Force (USPSTF) Web site.
- Screening for colorectal cancer. JAMA patient page. JAMA. 2016 Jun 21;315(23):2635.
- Screening tests for colorectal cancer. JAMA patient page. JAMA. 2016 Jun 21;315(23):2636.

Myhealthfinder is a tool that provides personalized recommendations for clinical preventive services specific to the user's age, gender, and pregnancy status. It features evidence-based recommendations from the USPSTF and is available at www.healthfinder.gov.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

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